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# DIGITAL HIGH SCHOOL PHOTOGRAPHY CURRICULUM

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A Project  
Presented to the  
Faculty of  
California State University,  
San Bernardino

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
in  
Education:  
Career and Technical Education

---

by  
Martin Michael Wolin

June 2003

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Approved by:



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Dr. Joseph Scarcella, First Reader

5/28/03  
Date



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Dr. Ronald Pendelton, Second Reader

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## ABSTRACT

The purpose of this thesis was to create a high school digital photography curriculum that was relevant to real world application and would enable high school students to enter the work force with marketable skills or go onto post secondary education with advanced knowledge in the field of digital imaging. Since the future of photography will be digital, it was imperative that a high school digital photography curriculum be created.

The literature review goes into extensive detail about digital imaging. More specifically, what digital imaging is, the comparison between traditional and digital photography, the make-up of the digital darkroom, a history of conventional photography, a history of digital photography, definitions of digital imaging terminology, flatbed and film scanning, image-editing software, photographic composition, and project-based learning. The project consisted of a syllabus, a detail course outline and power point presentations.

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## DEDICATION

### To My Parents

Estella and Martin Wolin - I wish they could have been here to see me graduate. You were the best parents anyone could have.

### To My Sister

Dr. Carrole Wolin - Thank you for always being there and supporting me.

### To My Children

Lexie and Nick - I want you know I am proud of you and that anything is possible if you have perseverance. I love you both very much.

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Carl Hoff - Thank you for giving me so much so unselfishly and for always listening. I am lucky having you as my best friend.

### To My Love

Diane Hames - Thank you for loving me so much and treating me so well. You are the best and I love you completely.

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## TABLE OF CONTENTS

ABSTRACT .....	iii
ACKNOWLEDGMENTS .....	iv
CHAPTER ONE: BACKGROUND	
Introduction .....	1
Purpose of the Project .....	1
Context of the Problem .....	1
Significance of the Project .....	2
Assumptions .....	3
Limitations and Delimitations .....	4
Limitations .....	4
Delimitations .....	4
Definition of Terms .....	5
Organization of the Thesis .....	10
CHAPTER TWO: REVIEW OF THE LITERATURE	
Introduction .....	11
What is Digital Imaging .....	11
Traditional and Digital Photography .....	12
The Digital Darkroom .....	14
History of Traditional Photography .....	17
History of Digital Photography .....	18
Digital Imaging Terminology .....	19
Flatbed and Film Scanning .....	20
Image-Editing Software .....	22
Photographic Composition .....	23



Project-Based Learning .....	25
Summary .....	26
CHAPTER THREE: METHODOLOGY	
Introduction .....	28
Development .....	28
Resources and Content Validation .....	29
Design .....	30
Population Served .....	31
Summary .....	31
CHAPTER FOUR: CONCLUSIONS AND RECOMMENDATIONS	
Introduction .....	33
Conclusions .....	33
Recommendations .....	33
Summary .....	34
APPENDIX A: SYLLABUS DIGITAL HIGH SCHOOL PHOTOGRAPHY CURRICULUM .....	35
APPENDIX B: DETAILED COURSE OUTLINE DIGITAL PHOTOGRAPHY .....	39
APPENDIX C: PROJECT-BASED ASSIGNMENTS .....	60
APPENDIX D: POWERPOINT – CAREERS IN PHOTOGRAPHY .....	74
REFERENCES .....	101

## CHAPTER ONE

### BACKGROUND

#### Introduction

The content of Chapter One presents an overview of the project. The contexts of the problem are discussed followed by the purpose, significance of the project, and assumptions. Next, the limitations and delimitations that apply to the project are reviewed. Finally, definitions of terms are presented.

#### Purpose of the Project

The purpose of the project was to develop a yearlong high school digital photography curriculum. This course supplements the existing traditional photography courses. Although the curriculum concentrated on computer technology and graphics, the ultimate goal was to present the students with alternative ways to create photographic works of art and effective commercial photographs.

#### Context of the Problem

The context of the problem was that there were very few dedicated digital photography classes for high school students that were relevant to real world applications. Completion of this class would enable students to enter the work force with marketable skills or go onto post

secondary education with advanced knowledge in the field of digital imaging.

Because of computer and digital equipment costs and the need to continually update them, especially digital cameras and software programs, the ability to always have the necessary equipment and supplies necessary to operate a successful program can be extremely costly. Much time was spent looking for grants to help start and sustain the program.

#### Significance of the Project

The future of photography will be digital and high school photography students need to be introduced to a comprehensive digital photography class in order to go on to post secondary education or possess skills necessary to successfully enter the workforce. The curriculum incorporated all phases related to professional digital imaging. This included a detail description of what digital imaging is, a comparison between traditional and digital photography, the make-up of the digital darkroom, a history of traditional photography, a history of digital photography, digital imaging terminology, flatbed and film scanning, enhancing and manipulating images using image-

editing software, photographic composition, and project-based learning.

#### Assumptions

The following assumptions were made regarding the project:

1. There is an important need to incorporate a high school digital photography program.
2. The future of photography will be digital.
3. Any student interested in being a photographer must know digital imaging and computer technology in order to be competitive in the work force or go on to advanced study - post secondary education.
4. High school students are capable of understanding the principles and techniques involved with digital imaging.
5. In order for the class to be relevant, there must be a periodical updating of computers, digital imaging equipment and related software.
6. Outside funding sources are needed to maintain and update hardware and software.
7. The school administration will support the digital photography program.

## Limitations and Delimitations

During the development of the project, a number of limitations and delimitations were noted. These limitations and delimitations are presented in the next section.

### Limitations

The following limitation apply to the project:

1. This curriculum is targeted for high school students who have completed other photography and computer classes.
2. The cost of implementing this program can be high due to hardware and software requirements.
3. More space may be needed for the additional equipment requirements.

### Delimitations

The following delimitation apply to the project:

1. This curriculum could be an addition to any existing high school photography program.
2. Additional funding sources could be found to pay for the additional hardware and software needed to implement this program.
3. Doing away with some obsolete equipment can create the additional space needed.

## Definition of Terms

The following is a glossy of computer and digital photography terms most often used when discussing digital imaging.

Adobe Photoshop - A pixel-based image editing program

which has become an industry standard (Davies, 2000).

Anti-aliasing - A method of reducing the effect of

aliasing by averaging the densities of pixels at the edges of items such as text, thereby softening their appearance (Davies, 2000).

Application - Software in the form of a program such as

Adobe Photoshop (Davies, 2000).

Analogue - A signal that represents sound or vision by

electrical analogy, e.g. variations in a DC voltage producing corresponding variations in luminance, or vice versa. Similarly, a silver photographic negative is an analogues representation of the subject .  
(Davies, 2000).

Artifact - Imperfections in digital information resulting

from limitations in the device used to create the image. Examples include noise, aliasing, and color fringing (Davies, 2000).

Back-up - A duplicate copy of digital data, made to prevent loss of the data through disc or system failure (Davies, 2002).

Banding - Where a continuous varying gradation of tone that is monochrome or colored is represented digitally by too few grey levels or colors, then visible tonal bands are seen. The effect is sometimes known as contouring or posterization (Davies, 2000).

Batch Processing - Programming a computer to process several images or other files automatically, as time becomes available (Davies, 2000).

Bicubic - A method of interpolation whereby, in order to increase image resolution, the value of the new pixel is determined by a weighted average of four pixels surrounding the pixel of interest (Davies, 2000).

Binary - A numerical coding system using only two digits, 0 and 1. Two binary digits, or bits, can give only four possible combinations: 00, 01, 10, 11  
Three bits can give 8 ( $2^3$ ) possible combinations - 000, 001, 010, 011, 100, 101, 110, 111 (Davies, 2000).

Bit - Short for binary digit - a single number having the value either zero or one, which may represent the

states of on or off. Eight bits make up one byte (Davies, 2000).

Byte - The standard unit of binary data storage in computer memory or disc files (Adobe Systems Incorporated, 2000).

Charge Coupled Device (CCD) - A solid-state image pick-up device or photo sensor most commonly composed of a rectangular matrix (area array) or single row (linear array) of light sensitive picture elements (or pixels). Light falling on to these elements produces an electrical charge proportional to the amount of light received. The output voltage is in analogue form, and must be converted to digital form by means of an ADC before it can be output to a computer (Davies, 2000).

Compact Disc Read Only Memory (CD-ROM) - This term is often used to describe any compact disc, but is strictly defined by the Yellow Book standard to define additions to the compact disc digital audio format so as to make them readable by computer (Davies, 2000).

Channel - One of the major components of an RGB or CMYK image, e.g. red channel, or cyan channel (Davies, 2000).



Cloning - The selection and duplication of groups of adjacent pixels within an image (Davies, 2000).

Digital Noise - Tiny light-colored spots especially noticeable in the shadow areas of digital images and are visible effects of an electronic error (Klasey, 2002).

Dots Per Inch (DPI) - The number of pixels per inch. The greater the number of pixels at the time an image of a given size is digitized, the greater the amount of detail that is recorded (Upton, 1998).

Dynamic Range - The ability of a scanner to reproduce detail at extremes of highlight and shadow - the darkest and brightest areas of the picture (Klasey, 2002). Dynamic range in digital cameras is the ratio between the brightest and darkest recordable parts of an image or scene (Chaney, 2002).

Histogram - Histogram functions on a digital camera allows the photographer to quickly and easily see the accuracy and "spread" of the exposure over the cameras grayscale or dynamic range (Askey, 2002).

Image-Editing Software - Computer programs, like Adobe Photoshop, which contain editing commands that change the image (Upton, 1998).

Interpolation (Resampling) - Is an image method for increasing the size of a digital image (Askey, 2002). Averaging the values of the surrounding existing pixels creates new pixels (Klasey, 2002). Reduces the jagged appearance of a low-resolution image by automatically resampling up while printing (Adobe Systems Incorporated, 2000).

Operating System - The most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs (Raaf, 2002).

Pixel - Literally is a fusion of the words "pictorial elements." A screen pixel is the smallest area that a particular combination of software and hardware can illuminate on a monitor (Raaf, 2002).

Posterization - A photographic printing method or special effects filter in Adobe Photoshop which reduces a continuous tone monochrome or color image to a predetermined small number of tones, each of which is a uniform tone or color value (Davies, 2000).

Resampling - Changing the resolution of an image, either by discarding unwanted pixels, or by interpolating new ones (Davies, 2000).

Saturation - The strength or purity of a color (Davies, 2002).

Small Computer System Interface (SCSI) - This type of port permits high-speed communication between the computer and peripheral device, such as a scanner, external hard disc, or even digital camera (Davies, 2000).

#### Organization of the Thesis

The thesis portion of the project was divided into four chapters. Chapter One provides an introduction to the context of the problem, purpose of the project, and significance of the project, limitations and delimitations and definitions of terms. Chapter Two consists of a review of relevant literature. Chapter Three documents the steps used in developing the project. Chapter Four presents conclusions and recommendations drawn from the development of the project. The Appendixes for the project consists of: Appendix A Syllabus, Appendix B Detailed Course outline, Appendix C PowerPoint Presentations, and Appendix D Sample Projects. Finally, the Project references.

## CHAPTER TWO

### REVIEW OF THE LITERATURE

#### Introduction

Chapter Two consists of a discussion of the relevant literature. Specifically, what is digital imaging, traditional and digital photography, the digital darkroom, history of digital photography, digital imaging terminology, flatbed and film scanning, image-editing software, photographic composition, and project-based learning.

#### What is Digital Imaging

The term digital photography or digital imaging came about after the image-editing software program, Adobe Photoshop, was introduced in 1990. Although Kasai and Sparkman feel that there is no specific definition defining digital photography or imaging, they state the term is often used in the following cases:

- When photographs are taken without using film - i.e. a digital camera.
- When existing images, on film or photographic paper, are scanned to create digital image data.
- When the digital image data is processed on a computer.

- When some type of hard copy output is generated from the final digital image data. The hard copy can be an offset print, a color film recording, an inkjet print, or some other format (Kasai & Sparkman, 1997, p. 2-2).

Most of the literature reviewed defined a digital image as any system or device in which information is stored or manipulated by on/off impulses, so that each bit of information has an exact or repeatable value. Digital information is stored in bits and bytes, with each representing on/off or one's and zero's. In addition, when this information is reconstructed it forms a photographic image with the aid of a technical device. In more basic terms, a digital image is an electronic form of image capture that records information numerically and is capable of being retrieved and manipulated by a computer and later outputted in print or film form.

### Traditional and Digital Photography

There are major difference between digital photography and traditional silver halide photography. These differences need to be discussed and understood in order to make the leap into digital imaging. In silver halide photography the resolution, or ability to

distinguish between objects that are very close to each other, depends on the properties of the emulsion (light sensitive material on film or paper). In digital photography, there are basically two types of sensor devices currently being used, the Charge-Coupled Device (CCD) and the Complementary Metal Oxide Semiconductor sensor device (CMOS). With the CCD image sensor device, resolution depends on the number of light sensors, it's size and shape, and the method of image generation after sampling - the proprietary software of the camera or chip manufacturer. Since the CMOS sensor generally produces a greater amount of noise in the form of electronic distortion, sophisticated software based filtering algorithms are used in the cameras central processor. How effective this software is, determines the resolution of the camera and increases the cost of the camera.

One of the main advantages of digital cameras in the classroom is that the entire process from exposure, manipulating, and printing, can be done during a typical class session (Bolkan, 2002). In contrast, traditional silver halide photography film needs to be developed, dried and cut before the images can be viewed and this takes a much greater amount of time than is normally available in one class session.

The similarities between conventional and digital image capture end when the light rays reflected from the subject reach the camera's film plane. In conventional, or silver halide photography, the light causes a latent image to form in the film emulsion, which is brought out in development. With digital imaging, light rays strike thousands of millions of tiny sensors. These sensors may be Charged Coupled Devices or Complementary Metal Oxide Semiconductors (Klasey, 2001, p. 412).

#### The Digital Darkroom

The world of digital photography has changed forever, and the sole technology responsible for this paradigmatic shift is that of the microchip. For traditional photographers, the intrusion of micro technology into the coveted realm of image making has been a blessing and a burden (Ippolito, 2003, p. 2). Much of the literature reviewed stated that it has been a blessing because it has created an endless amount of creative possibilities, some of which were impossible with the past photographic technology, or at best, very difficult to achieve. On the other hand, some believe that digital technology has adversely affected the credibility of the photographic

image and this also is indicated by the literature reviewed.

The digital darkroom consists of a computer with image editing and operational software, and peripherals. Peripherals are devices that extend the capabilities of the computer.

Common desktop computing platforms are the IBM PC-compatibles with a version of Microsoft's Windows operating system or the Apple Macintosh with a version of Apple's MAC OS operating system. In considering which type of computer system to use, Ippoloito states that the following information needs to be taken into account:

- Is a portable or stationary computer needed?
- What speed is the microprocessor (CPU)?
- How much RAM does the computer have installed, and can it be upgraded?
- How much storage space is available, or can be added?
- What types of DVD, CD, or other reading/writing devices are included?
- What types of communications devices are included or available, so that the computer can be connected or networked with other computers?



- What kind of graphic display system is incorporated?
- What types of removable storage are available: Zip, floppy, or other storage devices?
- What type of expansion is available: serial ports, parallel ports, USB and Fire Wire ports, internal expansions slots, etc.?
- What is the display size, and how accurately can it be calibrated (Ippolite, 2003, p. 6).

It is important to note that the speed of the processor is a major concern because photographic images represent some of the largest files a computer will need to process. Another extremely significant consideration is the amount of random access memory (RAM) because this is where the large image files will be stored during processing. The larger the image files, the more RAM is needed. Finally, because photographic image files are large, a great deal of storage space is required in order to house all the images and leave enough free space.

As previously stated, peripherals are add-on devices that extend the capabilities of the computer. The ones needed for a digital darkroom room are ink jet or thermal

dye sublimation photographic printers, flatbed and film scanners, digital cameras and CD players and recorders.

### History of Traditional Photography

Aristotle described a method of viewing the solar eclipse by punching a small hole in a metal plate, holding it up to the sun resulting in an image of the sun being projected on the ground. This simple optical principle is the foundation of photography (Annett, 1999).

Although Leonardo Da Vinci did not invent the camera obscura, he is credited with using the camera to draw, which he never used it for. It was not until the Renaissance that the instrument was extensively used as a drawing tool.

There were many people like Joann Schulze, Joseph Niepce, Louis Daguerre, William Talbot, and Niepce de St. Victor who contributed to the early development of photography. However, it was George Eastman who brought photography to the masses with his introduction of the Kodak Brownie camera. With the camera selling for one dollar, almost everyone could afford it, and Kodak became a household name.

Since this time, there have been major improvements in both the film and camera. Ever mutable and adaptable,

photography continues to involve and is yet undergoing another metamorphosis (Annett, 1999, p. 10).

### History of Digital Photography

Digital image technology has evolved from analog electronic technology. The invention of the television in the 1940s was the first extensive innovation from which electronic images were created. Approximately ten years later, Bing Crosby Laboratories developed the video tape recorder, which recorded analog television images to magnetic tape and were later perfected by the Ampex Corporation. In the 1960s NASA sent out probes to map the Moon's surface, before landing a manned lunar mission. NASA missions used video cameras and transmitters to broadcast the analog video signals/images, but the transmissions were incoherent due to natural forms of radio interference (Ippolito, 2003, p. 34). To solve this dilemma, NASA found a way to covert the analog signals/images into digital data for computer processing to clarify the images by removing unwanted visual noise. Thus, digital imaging was born and a rebirth of photography was about to take place.

Much of the basis of digital imaging technology and image processing software has come from the Department of

Defense and spy satellite technology. In addition, Adobe Photoshop was a specialize program that was originally developed by George Lucas to create special effects in Star Wars (pixelphoto.com, 2002).

### Digital Imaging Terminology

The literature reviewed uses an enormous amount of vocabulary unique to digital photography. Most of the references used have a section dedicated to digital imaging terminology. It is impossible to learn and effectively use this technology without using these words.

Davis states that the technologies involved in digital imaging cross many subject boundaries - computing, photography, publishing, printing, science, telecommunications and graphics. Each of these technologies has it's own language, or jargon often incomprehensible to people outside that particular industry (Davies, 2000, p. v). The author further states that the technology associated with digital imaging is growing and expanding rapidly, and with this comes new terms. Ippolito adds to this by saying that some of the definitions given when talking about digital photography are specific to this area of study and many of the terms

can be defined differently based upon the context in which they are used.

### Flatbed and Film Scanning

Scanners are computer peripherals that allow for the conversion of analog image information into digital image data. During scanning, a light is projected onto the image and sensors convert the picture into a digital form that can be stored, viewed, enhanced, and manipulated on the computer (Lezano, 1999). Most scanner software is TWAIN (Technology Without An Interesting Name) compatible, which means it is capable of functioning with most major software packages.

There are three main types of scanners - drum, film and flatbed. Drum scanners are extremely expensive, ranging in price from \$25,000 to several hundred thousand dollars, but are capable of high resolution scanning of analog image information, which is converted into digital data by an analog-to digital converter (ADC). The image is attached to a drum, and is scanned while the drum rotates at a high speed (Ippolito, 2003). Film scanners are used to digitize color negative film, color transparency film and black and white film. Film scanners have a much higher resolution than flatbed scanners, with a dpi as high as

4800 and a dynamic range of 48. The dynamic range is the range of difference between light and dark that the device can capture (Kasai & Sparkman, 1997, p. 4-2). Flatbed scanners are used to scan original artwork (reflective or transparent) that is kept flat and placed on a glass plate. They are relatively easy to use and are available in a variety of price ranges and sizes.

Scanner resolution is measured in dots per inch (DPI). Scanning at maximum resolution produces the highest quality scans and can result in a very large file size, which requires the computer to have a lot of memory. Determining the highest resolution needed for best results is based on the final output size of your print. Lezano states that an easy formula to follow is: scanning resolution = final resolution x magnification. For instance, if one wants a 300dpi 8x10 inch print from a 4x6 print you must scan it a 600dpi [300dpi x 2] (Lezano, 1999).

The speed at which it takes your scanner to make a complete scan is based, in part, on the make of the scanner, the software, the size of the scan, and the type of connector. Fire Wire connectors are the fastest, followed by USB, SCSI, and parallel port.

While scanners include software that transfers the digitized image to the computer, the act of scanning the image will slightly change the brightness, contrast, and sharpness of the digitized image from the original. To compensate for these changes, it is necessary to have image editing software such as Adobe's Photoshop that will enable one to manipulate the image (Lockmiller, Macklin, 1999, p. 21).

#### Image-Editing Software

There are many image-editing software programs available, but Adobe Photoshop is the de facto standard in the photographic graphic arts industries (Ippolito, 2003, p. 134). On one hand, it's the absolute state-of-the-art for image manipulation with endless possibilities. On the other hand, it is a very complex program that is difficult to master, and one that demands a great deal of patience and practice as well as a great deal of RAM (Rose, 1997).

One of the great things about digital photography and image-editing programs is that one is never limited to the image that comes out of the camera, as in traditional photography (King, 2000). Software editing programs display a variety of tools that let one select an area in order to change its characteristics (London, Upton, 1998,

pg. 260). Photographs can be cropped, color and contrast corrected, brightened, and sharpened. One can eliminate or completely change backgrounds, combine images, and create special effects and illusions using filters (Pack, 2001).

In the past photographers had to rely on independent retouchers and restoration artists to retouch or repair a photograph. People in portraits often need to have pimples, crow's feet, moles, scars, birthmarks, bruises, bald patches, glare, and blemishes eliminated (Lute, 2002). With the sophisticated imaging software programs available, photographers are now capable of doing their own retouching.

### Photographic Composition

For the commercial or art photographer to express themselves fully, they must have a deep understanding of composition and a mastery of the many techniques available; especially in the field of digital photography and image-editing software. They must be able to analyze what they see in relation to what their cameras will record in order to choose the best camera position (Litzel, 1975, p. 8). It is only by using correct composition that a photographer can fully express their ideas. The compositional elements are the building blocks



of creative art and are used in much the same way as a builder uses concrete, steel, and glass (Litzel, 1975, p. 8). Careful placement of a subject within the frame can weaken or strengthen an image. Placement can draw attention go or away from a part of a scene. It can add stability or create momentum and tension (London & Upton, 1998, p. 332).

The components of composition include line and direction, shape and size, color and texture, and tonal value. The principles of composition include harmony, contrast, unity, and gradation. Types of composition include rhythm, leading line, framing, silhouette, diagonal, s-curve, rectangle or l-shape, circular, intersecting lines, and rule of thirds. Additional elements of composition include balance, formal and informal; format, horizontal and vertical; and mood, low and high key.

Photographing an object in an abstract way, by only including parts of it, is an effective way to make the ordinary, extra-ordinary. Another way a photographer can create an abstract photograph is to manipulate it using Adobe Photoshop. Using different filters, adjusting the color and contrast, can easily create abstract

photographs. The only limitation a photographer has is his or her imagination (Litzel, 1975).

Depth of field affects sharpness from near to far. A wide aperture produces shallow depth of field, while a small aperture produces a lot of depth of field. People tend to look first at the sharpest part of a photograph (London & Upton, 2000, pg. 328). If a photograph is completely sharp, the viewer is most likely to see all parts of it has having equal importance. However, if the image has limited depth of field, the part that is in focus becomes the "focus" of attention (London & Upton, 2000, pg. 328).

### Project-Based Learning

A review of the literature defined Project-based learning has an instructional method that uses complex, real-life projects to motivate learning and provide learning experiences. Students participate in projects and practice an interdisciplinary array of skills. Dave Moursund of the International Society for Technology in Education (ISTE) defines project-based learning as an open-ended assignment that provides students with a degree of choice and with the project extending over a considerable period of time.

In project based teaching, the teacher acts as a facilitator designing the activity, providing resources, and giving advice and guidance. Students use higher levels of thinking to analyze information, make discoveries and create original work. The projects are usually interdisciplinary and the students work in teams of different sizes. Project-based learning provides an authentic environment in which teachers can help students increase their skills through cooperative learning and collaborative problem solving (Lamb, 2001).

Project based learning fits well with technology-rich learning environments, such as digital imaging, where the focus is not on the hardware or software, but on the learning experience - where technology is used to facilitate learning. It may be a tool used to organize ideas, such as inspirations, and creates excitement in learning (Lamb, 2001).

### Summary

The literature important to the development of a high school digital photography curriculum was presented in Chapter Two. Digital imaging encompasses a great deal of new technology. Much of the hardware and software necessary to produce digital images is on the cutting edge.

of technology. The future of photography will be digital and students must have this knowledge in order to be prepared to enter the workforce or go on to post secondary education.

## CHAPTER THREE

### METHODOLOGY

#### Introduction

Chapter Three documents the steps used in developing the project. Specifically, the development of the curriculum, resource and content validity, and a description of the population being served. The chapter concludes with a summary.

#### Development

The purpose of this project was to develop an effective and comprehensive high school digital photography course that is relevant to real world application and advanced learning in post secondary education. The curriculum was designed through the use of digital photography textbooks, industry and trade journals, instructors at high school, professional digital photographers, the visual arts content standards for the state of California and the Baldwin Park Unified School District, and the teacher's knowledge and designed projects, tests, and assignments.

Objectives for the students to focused on:

- History of digital photography
- Utilization of technology

- Creative expression
- District and State visual arts content standards

### Resources and Content Validation

The development of the curriculum was determined by variety of different resources. To validate the contents of this curriculum, an ad hoc advisory committee was formed, the contents were presented to the committee, which reviewed the course curriculum and made recommendations. The selection criterion for the advisory committee members was that they be professional photographers who have extensive experience with digital imaging or art/technology teachers. The following people were selected to help in the curriculum development:

- Carl Hoff - Professional digital photographer and printer.
- Charlotte Nelson - High school Art teacher and Department chairperson.
- Dixie Coultant - Digital high school technology coordinator and Art/Photography instructor
- Gwen Lute - World-renowned Adobe Photoshop expert and author.

- Pauline Kimball - Digital Design Professional and Photographer.
- Chuck Rowley - High school Art and Photography Teacher.

Out of the many textbooks used as resources, two were selected as the current textbooks: Understanding Digital Photography (Ippolito, 2003) and Adobe Photoshop 7 Creative Workshop (Anderson, 2002).

### Design

The design of the project was to use all of the resources listed to develop a curriculum that taught students the skills necessary to be competent in all major aspects of digital photography and imaging. In addition, the curriculum was designed to be relevant to real world application meeting industry standards and enabled students to go onto advance training in post-secondary education.

The curriculum included a history of digital imaging, a description of what digital imaging is, a comparison between traditional silver halide photography and digital photography, the make-up of a digital darkroom, digital imaging terminology, flatbed and film scanning, and the power and capabilities of imaging editing software. Much of the curriculum was focused around project-based

learning founded on real world applications and assignments.

#### Population Served

This course was developed for all high school students who have successfully completed computer and photography courses. It was intended to supplement the existing photography and commercial art classes and stresses the fact that all indications predict that the future of photography will be digital.

Although the course is very technical in nature, the ultimate goal was for students to be able to express themselves creatively using this new medium and to understand the historical context, especially as it pertains to the affects of the digital image in our society.

Also, this course was designed to meet the F and G requirement for acceptance into the University of California. The University of California requires that students have a minimum of one year of approved visual or performing arts courses.

#### Summary

The Digital Photography course is an entrance level course designed for high school photography students who



have taken previous photography or computer classes. Based upon the literature review and insight provided by the advisory committee, the future of photography will be digital. Digital imaging is already playing a major role in photography for the fine art and commercial photographer. In order for students to prepare for a career in photography or go onto post secondary education, they must be proficient in digital imaging.

## CHAPTER FOUR

### CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

Included in Chapter Four was a presentation of the conclusions gleamed as a result of completing the project. Further, the recommendations extracted from the project are presented. Lastly, the chapter concludes with a summary.

#### Conclusions

The conclusions extracted from the project follows.

1. The future of photography will be digital.
2. Digital imaging is already changing the shape of photography.
3. High school students studying photography need to learn about digital photography.

#### Recommendations

The recommendations resulting from the project follows.

1. Because the future of photography will be digital and the realization that it is already changing the face of both commercial and fine art photography, it was recommended that a course focusing specifically on digital

photography be implemented for high school students.

2. The high school digital photography course should incorporate the history of digital imaging.
3. Students will be presented with a glossary of computer and digital photography terms.
4. Curriculum needs to be evaluated annually by both instructor and advisory board due to the rapid changes in digital technology.
5. Because of the high cost of maintaining and updating digital equipment and supplies and the state's budget deficient, additional funding sources need to be considered.

#### Summary

Chapter Four reviewed the conclusions extracted from the project. Lastly, the recommendations derived from the project were presented.

## Sierra Vista High School

### Course Outline

#### Digital Photography

#### **Course Description**

This one-year course will provide the student photographer with advanced skills and procedures in digital imaging. These skills include using film and flatbed scanners, digital cameras, digital color printers, and working in the image editing software program Adobe Photoshop. Students will produce both fine art and commercial photographs that emphasize creative expression incorporating effective compositional techniques, consistent exposures, and good lighting. Continue use of good work habits and ethics is always stressed. In addition, the history of digital photography will be discussed, along with new terminology related to digital imaging and computer technology. This course is designed to meet the University of California requirements for the visual arts and addresses both the California State and Baldwin Park Unified School District Standards.

#### **Prerequisites**

One or more of the following classes:

- Photography I
- Art I
- Commercial Art
- Advanced Computer Applications
- Computer Business Skills
- Computer Education

#### **Instructional Methods and Strategies**

- Lectures – using personal photographic experiences
- Teacher demonstrations
- Visual presentation

- Peer tutoring
- Guest speakers
- Project based learning
- Cooperative work – group learning
- Internet Sights

### **Course Goals**

- Create photographic artwork using digital technology.
- Create photographic commercial photographs using digital technology.
- Demonstrate ability to respond to, analyze, and make critical assessments about digital photographic images.
- Demonstrate an understanding of the historical contributions and cultural dimensions of digital photographic images.
- Have knowledge about the different career opportunities using digital photography.
- Have knowledge about the differences between digital imaging and conventional silver halide photography.

### **Methods of Evaluation**

Grades are based on:

- Digital Portfolio
- Class Notebook
- Quizzes and Exams
- Photographic Critiques
- Participation

**Course Fee/Materials**

- \$30.00 lab fee per semester
- Three ring binder notebook with dividers, writing paper, pens and pencils
- 10 rolls of 35mm color negative film – 24 exposure – film processing to be paid for by student at an outside photo lab
- A 50 sheet package of Epson Heavyweight Matt Photographic paper (8<sup>1/2</sup> X 11) for Epson ink jet printer

APPENDIX B  
DETAILED COURSE OUTLINE  
DIGITAL PHOTOGRAPHY

## Course Outline

- I. Orientation
  - A. School and classroom rules and regulations
  - B. Course description and requirements
  - C. Grading standards
  - D. Lab personnel and clean-up
- II. Safety
  - A. Lab tour with explanation of equipment and safety rules
  - B. Fire safety and prevention
  - C. Lab hazards
  - D. Lab practices
- III. Career Education
  - A. Career opportunities
  - B. Educational requirements and personal requirements
  - C. Sources of training and education
- IV. History of Conventional Photography
  - A. Aristotle
    - a. Formation of an image
    - b. Pin hole device
  - B. Leonardo Da Vinci
    - a. Camera obscura
    - b. During Renaissance period widely used as a drawing tool
  - C. Joann Schulze
    - a. Silver salts to make a permanent image
  - D. Thomas Wedgewood
    - a. Use of camera obscura to reproduce drawings
    - b. Applied Schulze's technique to sensitize leather
    - c. Produced the worlds first photo grams



- E. Joseph Niepce
  - a. Inventor of photography
  - b. Produced first photographs by coating pewter plates
- F. Louis Daguerre
  - a. Patented Daguerreotype process
  - b. Daguerreotypes had extraordinary clarity and beauty
  - c. Daguerreotypes could not be mass produced
  - d. Each image was singular and unique
- G. William Henry Fox Talbot
  - a. Invented negative-positive process
  - b. Discovered the latent image
  - c. Developed the Calotype process
- H. Niepce de St. Victor
  - a. Invented Albumen Photography
  - b. First commercially manufactured printing paper
- I. Frederick Scott Archer
  - a. Wet Collodion process
  - b. Collodion negatives were very fragile
- J. James Ambrose Cutting
  - a. Patented Archer's Wet Collodion process
  - b. Presented photographs in leather cases
- K. Julia Margaret Cameron and Nadar
  - a. Victorian Era photographers
- L. Roger Fenton
  - a. Crimean War photographer
- M. Matthew B Brady and Alexander Gardner
  - a. Civil war photographers
- N. Francis Frith
  - a. Photographed Egypt and the Holy Land

- O. William Henry Jackson
  - a. Photographed the Rocky Mountains and Lake San Cristobal in Colorado
- P. George Eastman
  - a. Introduces the portable box camera
  - b. Introduces flexible celluloid film
  - c. Introduces the Brownie Camera
  - d. Photography for everyone
  - e. Kodak becomes a household name
  - f. Slogan – “You press the button, we do the rest”
- Q. Development of small camera
  - a. Leica
  - b. The German monopoly on technology
  - c. Electronic flash
- R. Color Photography
  - a. Sir James Clerk Maxwell – additive system
  - b. Louis Ducos Du Hauron – subtractive system
  - c. Leopold Mannes and Leopold Godowsly
    - (1) Developed Kodachrome slide film
    - (2) Refined color process
- S. Twentieth century photographers
  - a. Straight photography
    - (1) Alfred Stieglitz
    - (2) Paul Strand
    - (3) Ansel Adams
    - (4) Edward Weston
  - b. Documentary photography
    - (1) Jean Eugene August Atget
    - (2) Dorothea Lange
    - (3) Margaret Bourke-White
  - c. Formalistic photography

d. Metaphoric photography

(1) Minor White

V. History of Digital Photography

A. First Drum Scanner

a. Light sensitive Photo Multiplier Tube

b. Early 1970's

B. Advent of Microprocessor

a. Mid 1970's

b. Scitex Company

(1) Signal from Photo Multiplier Tube

(2) Image stored in a computer and manipulated before outputted onto separation film

(3) Machines tremendously expensive and extremely complex

c. Mid 1970's Kodak begins investigating filmless photography

C. Earlier D. Gregg creates a crude forerunner to digital photography (1963)

D. Apple Computer – mid 1970's

a. Mates desktop computer, laser printer, and postscript language

b. Birth of desktop publishing

E. Mid 1970's George Lucas sells software application he developed for Star Wars

a. Repackaged for the commercial market and called Adobe Photoshop

F. Philips and Sony collaborate on the videodisk making digital imagery a practical reality

a. Uses computer technology

b. Sound and images digitally recorded

c. Imprinted as micro-pits on a disk

d. Laser used to optically scans the information and converts it into pictures and sounds on a home TV

- e. Commercially fails because of the video tape
    - f. 1980's video disk reemerges with the release of the compact disc (CD)
  - G. Kodak creates a sensor that records 1.4 million picture elements or megapixels
  - H. 1990's first digital camera appears for commercial use
  - I. Late 2002 Kodak announces a digital camera that is capable of recording 14 million picture elements
  - J. The future of photography is digital
    - a. Technology of digital imaging constantly improving
    - b. High end digital cameras, although still quite expensive, dropping in price
    - c. Quality of low cost ink jet printers is now photo realistic
  - K. Closing remarks
    - a. Much of digital imaging technology and image processing software came from the Department of Defense and spy satellites
    - b. Digital imaging is gaining a foothold
    - c. The powerful tools of digital technology have become available to designers, illustrators, and photographers
    - d. This has resulted in a substantial blurring of roles and shifting of responsibilities
- VI. Digital Imaging Terminology
- A. Adobe Photoshop
    - a. A pixel-based image editing program which has become an industry standard.
  - B. Anti-aliasing
    - a. A method of reducing the effect of aliasing by averaging the densities of pixels at the edges of items such as text, thereby softening their appearance.

- C. Application
  - a. Application in the form of a program such as Adobe Photoshop.
- D. Analogue
  - a. Silver photographic negative is an analogue representation of the subject.
- E. Back-up
  - a. A duplicate copy of digital data, made to prevent loss of the data through disc or system failure.
- F. Banding
  - a. Where a continuous varying graduation of tone is monochrome or colored is represented digitally by too few gray levels or colors, then visible tonal bands are seen.
- G. Batch processing
  - a. Programming a computer to process several images or other files automatically.
- H. Bicubic
  - a. A method of interpolation whereby, in order to increase image resolution, the value of the new pixel is determined by a weighted average of four pixels surrounding the pixel of interest.
- I. Central Processing Unit (CPU)
  - a. The central part of a computer
- J. Compact Disc Read Only Memory (CD-ROM)
  - a. This term is often used to describe any disc.
- K. Channel
  - a. One of the major components of an RGB or CMYK image, e.g. red channel, or cyan channel.
- L. Digital Noise
  - a. Tiny light-colored spots especially noticeable in the shadow areas of digital images and are visible effects of an electronic error.

- M. Digital Photography
- a. An electronic form of image capture that records a subject as numeric information that can be displayed and manipulated by a computer and later produced in printed form.
- N. Dots Per Inch (DPI)
- a. The number of pixels per inch. The greater the number of pixels at the time an image of a given size is digitized, the greater the amount of detail that is recorded.
- O. Dynamic Range
- a. The ability of a scanner to reproduce detail at extremes of highlight and shadow – the darkest and brightest areas of the picture.
  - b. Dynamic range in digital cameras is the ratio between the brightest and darkest recordable parts of an image or scene.
  - c. A scene that ranges from bright sunlight to deep shadow is said to have a high dynamic range, while indoor scenes with less contrast will have a low dynamic range.
  - d. Depending on the scene contrast, it may or may not be possible to capture the entire range with a digital camera.
  - e. In recording scenes with very high dynamic range, digital cameras will make compromises that allow the capture of only the part of the scene that is most important. This compromise is needed because no camera or output device of any kind, including the human eye, can reproduce the nearly infinite dynamic range that exists in real life.
- P. Gigabytes (GB)
- a. A unit of measurement equal to 1,024 megabytes.

Q. Histogram

- a. A histogram function on a digital camera or scanned image allows the photographer to quickly and easily see the accuracy and spread of the exposure over the camera's grayscale or dynamic range.
- b. The histogram itself is a graph of brightness along the horizontal axis, black to white, and the number of pixels at each brightness level on the vertical axis.
- c. If the "weight of the pixels" is predominantly in either the bottom or top of the grayscale, then the image is likely to be under or overexposed.

R. Image-editing software

- a. Computer programs, like Adobe Photoshop, which contain editing commands that change the image.

S. Interpolation (Resampling)

- a. Is an image method for increasing the size of a digital image. Averaging the values of the surrounding existing pixels creates new pixels.
- b. Interpolation reduces the jagged appearance of a low-resolution image by automatically resampling up while printing.

T. Operating System

- a. The most important program that runs on a computer.
- b. Every general-purpose computer must have an operating system to run other programs.
- c. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, controlling peripheral devices such as disk drives, scanners, and printers.
- d. Examples of operating systems are Windows and Mac OS.

- U. Pixel
  - a. Literally, a fusion of the words “pictorial elements”.
  - b. A screen pixel is the smallest area that a particular combination of software and hardware can illuminate on a monitor.
  - c. Most contemporary monitors can display a maximum of 72 pixels per inch (PPI).
  - d. A printer pixel is the smallest dot the printer can produce. Different printers have different dots per inch (DPI).
  - e. Generally, the higher the DPI, the higher the image quality.
- VII. Peripheral Device
  - a. A piece of hardware – such as a monitor, scanner, printer, or modem used in conjunction with a computer and under the computer’s control.
- B. RGB
  - a. A three-channel image containing a red, green, and blue channel.
- VIII. Conventional/Silver Halide Photography vs. Digital Photography
  - A. Resolution
    - a. Conventional photography resolution based on ISO of the film
    - b. Digital photography resolution based on the number of megapixels and software
  - B. Color
    - a. Conventional photography depends on properties of the photographic emulsion
    - b. Digital photography depends on color profiles build into cameras firmware
  - C. Convenience
    - a. With conventional photography, camera operation and convenience have been perfected over time.
    - b. With digital photography, proficiency in personal computers required. Technology evolving so operability improving.



- D. Creative Possibilities
  - a. If not using your own darkroom with conventional photography, high dependence on outside lab with can limit creativity.
  - b. With digital photography, creative possibilities are unlimited because of Adobe Photoshop.
- E. Image Quality
  - a. With conventional photography, good image quality can be up to 20 times the original size.
  - b. With digital photography, almost unlimited possibilities with high resolution images through interpolation.
- F. Cost
  - a. With conventional photography, fixed costs for cameras and equipment relatively low. High compatibility between equipment
  - b. With digital photography, initial investment in cameras, computers, scanners, memory and printers very expensive.
- G. Time Exposures
  - a. With conventional photography, unlimited if reciprocity of film taken into account.
  - b. With digital photography, long exposures can produce "noise". With new software becoming available, noise can be controlled and minimized.
- H. Special Light Sources
  - a. With conventional photography, many restrictions apply – based on type of film used. Shooting under different light sources can be very hard to correct.
  - b. With digital photography, electronically optimized light sensor system provides many opportunities. In addition, shooting under different light sources easily correctible with image-editing software.

- I. Environmental Conditions
  - a. With conventional photography, camera and film limits exist at high and low temperature.
  - b. With digital cameras, little temperatures dependence. However, it is necessary to insure stable power supply when cold.
- J. Latitude
  - a. Most films can record up to a maximum 9 stop luminance range with special processing.
  - b. Limit with digital cameras is 6 stops. However, technology is constantly changing.
- K. Credibility
  - a. High credibility due to film tampering easily detected.
  - b. Low credibility with digital imaging since no traces of tampering remain after post exposure processing. However, new technology becoming available for law enforcement that is tamper proof.
- L. Durability
  - a. Film can deteriorate over time.
  - b. Theoretically digital data does not deteriorate.
- M. Pros of Digital Photography
  - a. Every single shot can be immediately viewed on the LCD (Liquid Crystal Display) monitor of the camera.
  - b. Digital cameras have the ability to change the ISO rating from one frame to the next.
  - c. Creative possibilities are unlimited when working in an image-editing program
  - d. Theoretically digital data does not deteriorate over time.
  - e. The photographer has complete control from shutter release to printing.
  - f. Digital images have less grain/noise than silver halide film.

- g. Do not need a darkroom – can do everything in the comfort of any room.
- h. Can reuse storage media cards over and over again.
- i. Digital cameras can capture a greater dynamic range of information – especially in the shadow areas of an image.

N. Pros of Silver Halide Photography

- a. Camera equipment relatively inexpensive.
- b. Image quality difference between less expensive camera equipment very little, if any.
- c. Photographic film and paper have been perfected.
- d. High credibility when used in advertising, journalism, and forensics.
- e. Currently resolution of film is higher than digital.
- f. Currently exposure latitude of film is greater.

O. Cons of Digital Photography

- a. High initial cost of equipment and software
- b. The camera you paid \$5000 for last year is outdated and lost half its value.
- c. Software needs to be updated.
- d. Images can accidentally be erased.
- e. Storage media may not be readable in the future as formats and devices change.
- f. Low credibility since images can be tampered with; leaving no trace.
- g. Calibrating your monitor so it matches your output can be difficult.

P. Cons of Silver Halide Photography

- a. Chemicals used in processing and printing harmful to the environment.
- b. Need a darkroom to load film and make photographic prints.
- c. Difficult to manipulate images and certain special effects impossible.

- d. Photographic film, paper, and processing are expensive.
  - e. Silver halide films deteriorate over time.
  - f. Perfecting the craft of Black & White and color printing takes many years.
  - g. Film is very sensitive to scratches and dust.
- Q. Combining Conventional and Digital Photography
- a. By scanning film, which has a better resolution than current digital cameras, one can combine the best of both technologies.
  - b. Scanned images can then be enhanced and manipulated using image-editing software and outputted producing the best possible quality.
  - c. The tonal range possible by incorporating both technologies is far greater than each by itself.

## IX. The Digital Darkroom

- A. The Computer
- a. Speed of Central Processing Unit (CPU).
    - (1) The faster the CPU the better.
    - (2) The latest CPU today is old technology in a couple of months.
  - b. Amount of random access memory (RAM).
    - (1) The more RAM, the more efficiently you can work on a photograph.
  - c. Size of storage space (hard drive)
    - (1) Large hard drive is needed because photographic files are large.
- B. Film and Flatbed Scanners
- a. Nikon Super Coolscan 8000 ED film
  - b. Hewlett Packard Scanjet ADF Flatbed scanner.
- C. Image-Editing and Photographic Software
- a. Adobe Photoshop
  - b. Genuine Fractal
- D. CD and DVD Burner

- E. Digital Cameras
  - a. Nikon D1X
  - b. Fuji S-1 Pro
  - c. Sony Digital Mavica
- F. Digital printers
  - a. Fujifilm Pictography 3500.
  - b. Epson 1280 Ink Jet Printer.
- X. Adobe Photoshop 6.0 Software
  - A. Tools
    - a. Marquee
    - b. Move
    - c. Crop
    - d. Airbrush
    - e. Paintbrush
    - f. Clone Stamp
    - g. History Brush
    - h. Eraser
    - i. Gradient/Paint Bucket
    - j. Blur
    - k. Dodge
    - l. Pen
    - m. Type
    - n. Eyedropper
    - m. Hand
    - n. Zoom
    - o. Foreground Color
    - p. Background Color
  - B. Tool Options Bar
    - a. Context sensitive.
    - b. Changes as different tools are selected.

- C. Menu Bar
  - a. File selections
  - b. Edit selections
  - c. Image selections
  - d. Layer selections
  - e. Select selections
  - f. Filter selections
  - g. View selections
  - h. Window selections
  - i. How to use help
- D. Layers Palette
  - a. Layer lock options
  - b. Links
  - c. Active paint layer
  - d. Shows/hides layer
  - e. Double-click to edit layer effect
  - f. Creates layer style
  - g. Creates layer mask
  - h. Creates new/fill adjustment layer
  - i. Creates new empty layer
  - j. Trash
- E. History Palette
  - a. Set source for history brush
  - b. States of the image from first to most recent
  - c. Drag slider moves selection between states
  - d. Creates snapshot
- F. Actions Palette
  - a. Stop action
  - b. Record action
  - c. Play action

- G. Swatches Palette
    - a. Selecting a new color
    - b. Selecting a color from a photograph
  - H. Choosing a file format
    - a. JPEG
    - b. PSD
    - c. TIFF
- XI. Flatbed Scanner
- A. Open the scanner software from the desktop
  - B. Place your photograph face down on scanner
  - C. Select Preview
  - D. Use crop marks to select the area of the photograph you want scanned.
  - E. Select RGB
  - F. Select Zoom Scan to blow up selected area
  - G. Select output resolution
  - H. Select sharpness level
  - I. Select scan to Photoshop
- XII. Film Scanner
- A. Double click on the Nikon Scan icon
  - B. Place film in holder
  - C. Confirm that the status LED is glowing steadily
  - D. Slide film holder into open slot
  - E. Choose the type of film
    - a. Positive
    - b. Negative (Color)
    - c. Negative (Monochrome)
    - d. Kodachrome
  - F. Select calibrated RGB
  - G. Choose the frame to be scanned from the thumbnail drawer

- H. Click on the thumbnail of the frame you want
- I. Click the preview button to create a preview
- J. Open the tool chest
  - a. Click on the Tools button
  - b. Select Tool Palette
- K. Click on the Digital Ice box
  - a. Removes dust and scratches from the image
  - b. Select Normal or Fine
- L. Select Enable Post Processing
- M. Adjust the Digital ROC slider
  - a. ROC stands for Restoration of Color
  - b. Brings out faded colors in photograph
- N. Choose the area to be scanned by dragging the mouse over the image in the preview area.
- O. Use the tools in the Crop palette to specify resolution and size
- P. Click on the Scan button to scan the image
- Q. The scanned image will be opened in an independent image window, where it can be saved to disk
- R. Open the scanned image in Photoshop for editing

### XIII. Photographic Composition

- A. Definition
  - a. Photographic composition is simply the pleasing selection and arrangement of subjects within the picture area.
- B. Components of Composition
  - a. Line and direction
    - (1) Vertical lines are dominant and positive because they repeat the two vertical sides of the format.
    - (2) Horizontal lines are usually through of as restful or passive.



- (3) Diagonal lines are dynamic and may suggest movement
    - (4) Curving lines are lines of beauty.
  - b. Shape and size
    - (1) Two of the most important elements in photographic art.
    - (2) Shapes form the foundation upon which the picture is built.
    - (3) Camera position in relation to the nearest object is important because it controls size relationships with objects in the distance.
  - c. Color and Texture
    - (1) Color is not important to black and white except as it influences one's choice of filters to render gray tones in their proper values.
    - (2) Texture indicates depth on a two-dimensional print.
  - d. Tone Value
    - (1) A black and white photograph can consist of up to fifty gray tones plus black and white.
- C. Principles of Composition
  - a. Harmony is the link between repetition and contrast.
  - b. Contrast can be defined in two ways when discussing photography.
    - (1) Opposition or juxtaposition of different forms, lines, or colors in a work of art to intensify each element's properties and produce a more dynamic expressiveness.
    - (2) The relative difference between light and dark areas on a negative or print.
    - (3) Contrast can exist between size and shape; shape and value; size and value; and size, shape and value.

- c. Unity exists in a photograph when there is a strong dominating force/shape.
- d. Graduation is the gradual changing of one shape or tone into another, such as light into dark or small to large.

#### D. Types of Composition

- a. Rhythm – Repetition of shape (posts, columns, etc.).
- b. Leading line – Has a line (road, path) which directs the eye to the main subject.
- c. Framing – Uses an object in the foreground to frame an object in the background.
- d. Silhouette – A representation of an outline of something, usually filled in with black or another solid color, against a lighter background
- e. Diagonal – An image that implies speed or motion, with the action happening at an angle
- f. S-Curve – S-shaped line or road which can occur naturally or be man-made
- g. Rectangle or L-Shape – Has identifiable geometric shapes (rectangle or L) within the picture area
- h. Circular – Something that occurs in a circular format (cups, plates, tires, etc.)
- i. Intersecting lines – Lines that cross each other and direct the eye
- j. Rule of thirds – Placing the subject on the one third side of the photograph

#### E. Types of Balance

- a. Formal or Symmetrical – Is the arrangement of equal shapes placed to the right and left of the picture axis. Forms used on the right side of the axis must be repeated on the left side and the inclusion of any distracting elements must be avoided
- b. Informal – Both sides visually weigh the same, but can be extremely different.

F. Format

- a. Horizontal – A picture that is longer than it is tall. Lines go across. A peaceful, restful feeling is associated with this type of picture. Used primarily for scenic photographs.
- b. Vertical – A picture which is taller than wide. Lines go up and down. It implies strength and solidarity. Often used for portraits.

G. Mood

- a. Low Key – Mostly dark tones. Can be somber or romantic, depressing or scary. Evokes an emotional response in the viewer.
- b. High Key – Mostly light tones. Usually white on white with little difference in tone between the subject and the background. Used to create a happy, cheerful mood.

H. Abstract Photography

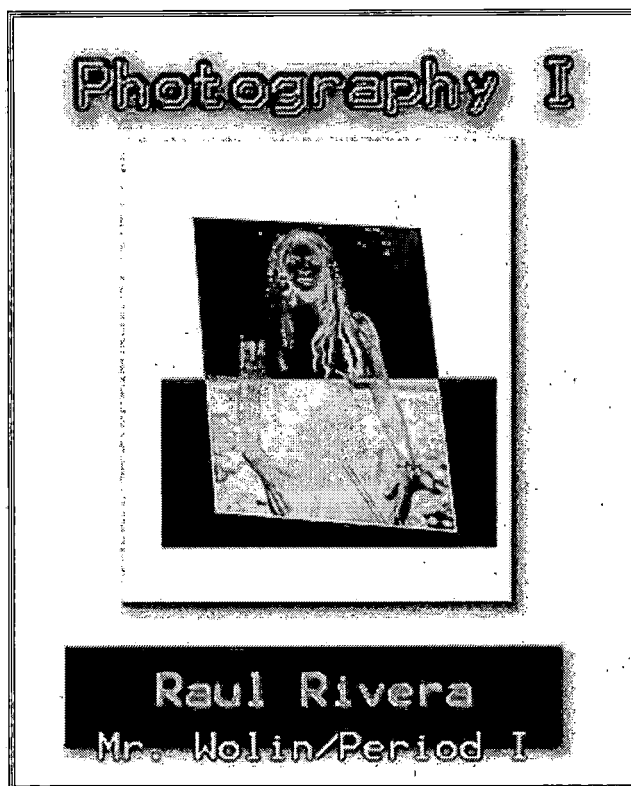
- a. Combining compositional elements in a unique and different way.
- b. Making the ordinary, extra-ordinary.
- c. Moving in close to a subject and selectively include only parts.
- d. Using special effect filters in image-editing software.

I. Depth of Field

- a. Depth of field affects sharpness from near to far.
- b. A wide aperture produces a little depth of field.
- c. A small aperture produces a lot of depth of field.
- d. If a photograph is sharp overall, the viewer is more likely to see all parts of it as having equal value.
- e. You can emphasize some part of a subject by making it sharper than the rest of the picture.

APPENDIX C  
PROJECT-BASED ASSIGNMENTS

## NOTEBOOK COVER PAGE



Sample Cover

The purpose of this assignment is to create a cover page for your notebook using computer and digital technology. Select a black and white photograph that you printed in the darkroom, place the image on a flatbed scanner to convert it to digital information, and import it into Adobe Photoshop.

You have complete creative control when producing your cover. The only requirement is that the dimensions of the cover be 8" X10" (printed on 8<sup>1</sup>/<sub>2</sub>" X 11" photographic quality paper) and includes the course title and period, your name, and instructors name.

Your cover page will be graded on originality, creativeness, effective use of Photoshop tools and adherence to directions. Your cover page must meet the same professional standards of the sample shown in class and on this handout.

# *Photography 1*

P  
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3



M  
r.  
W  
o  
l  
i  
n

*Maribel Lopez*

Sample Cover

## FLATBED SCANNING A THREE-DIMENSIONAL OBJECT



The image of the violin was produced by placing it on a flatbed scanner – no digital or conventional camera was used. Your assignment is to bring in a three-dimensional object, scan it and produce a piece of photographic art. The image must be enhanced and manipulated in Adobe Photoshop. The final image will be printed on the Fujifilm Pictography 3500 digital printer in color or black & white. Along with the print, you must turn in a detailed description documenting the image-editing changes you made in Photoshop.

When selecting an object to scan, be aware that objects that have more detail produce more visually interesting results. Some objects that have been scanned in the past and have produced excellent results were flowers, tools, musical instruments, fruit (sliced), hands, watches, and jewelry.

As usual, you have completed creative control and your work will be graded on originality, creativeness, effective use of Photoshop tools and adherence to directions.



# CREATING COLLAGES FROM ONE IMAGE



Using any photograph that you scanned or took with a digital camera, open it up in Adobe Photoshop so you can create a collage similar to the above example.

## Step-by-Step Directions

- After opening your photograph use the Rectangular Marquee tool to select a portion of your image.
- Copy the selection by pressing Ctrl C
- Paste the selection by pressing Ctrl V – which automatically is placed into its own layer.
- Press Ctrl T to access the Transform tool.
- Drag one of the corners of the selection to increase its size.
- Select enter to apply the Transformation

- **Click on the Add A Layer Style button located at the base of the Layers palette.**
- **Select Stroke from the pop-up menu**
- **Set your Stroke size to 5 pixels and the position to center.**
- **Select a color for your Stroke by clicking on the color rectangle.**
- **Click on the Add A Layer Style button, again.**
- **Select Drop Shadow and adjust the size.**
- **Repeat the above steps until you have broken apart the entire image.**
- **Submit the finished images for critique and printing.**

Remember, you have complete creative freedom with your photograph. Your work will be graded on originality, creativeness, effective use of Photoshop tools, and adherence to directions.

## **REPLICATE THE LOOK OF POLARIOD IMAGE TRANSFER DIGTALLY**



### **Step-by Step Directions**

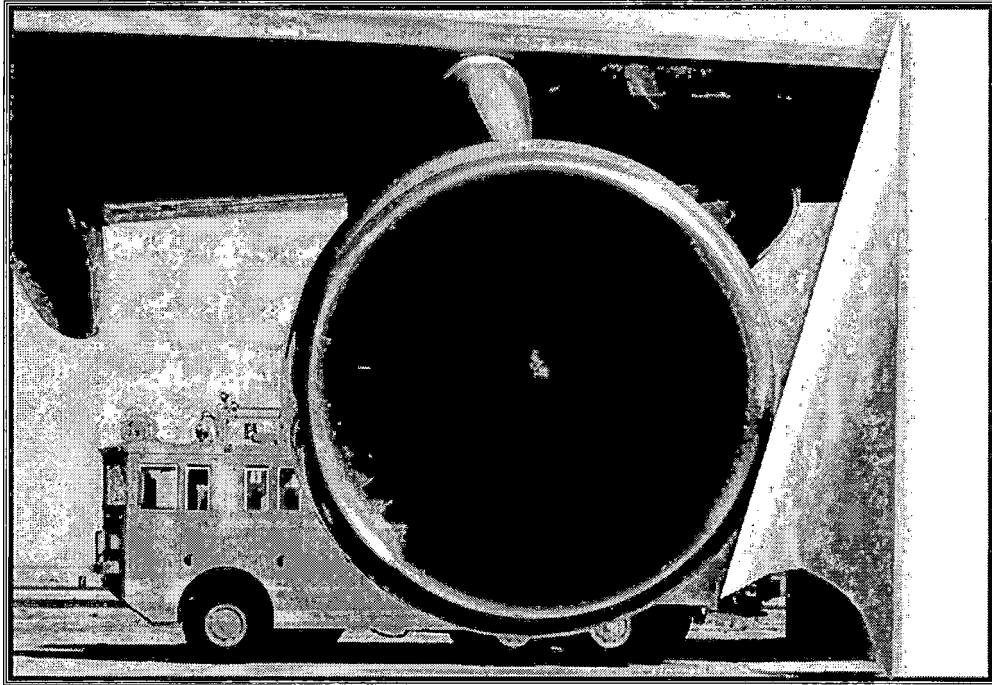
- **Select an image that that is digitized – either taken with a digital camera or scanned.**
- **Make sure both images have a resolution of 300 PPI.**
- **On the flatbed scanner, scan a piece of watercolor paper, rice paper, or textured paper – make sure the image is RGB.**
- **Open both images in Photoshop.**
- **Make a new document with a white background.**
- **Drag the paper image onto this new image.**

- Before dragging the photographic image make sure it is about an inch all the way around smaller than the paper image
- Also, before dragging it over select the whole image and Save Selection.
- Drag the photographic image onto the new image. Please note that each image will be placed on its own layer.
- Select the layer with the photographic image on it and change the blending mode from normal to Multiply this allows the paper texture to show through.
- Select the paper image go to Filter>Artistic>Film Grain. In the resulting dialog box, set the Grain slider to 4, the Highlight Area to 0, and the Intensity to 6.
- Select the photographic image layer and on the Menu Bar go to Select>Load Selection. This will put the Marching Ants around the photograph.
- Press Q on the keyboard and this will allow you to edit your image in the Quick Mask mode, filling the area with a reddish colored mask.
- Go to the Brush palette and select a medium size Spatter brush.
- Using white, paint a rough edge all around the photograph
- Press Q, again returns you to the standard mode and your mask becomes a selection.
- On Menu Bar go to Select> Inverse.
- Press delete on the keyboard.
- On the Layers palette select New Layer
- Go to the Brush palette and select a medium size Spatter brush.

- **Using black, paint on the inside, occasionally going on the outside of your rough edge.**
- **Set the Layer's Blending mode to Overlay**
- **Select the photographic image layer and use the eraser to remove any of the black past the edges of the photograph.**

You have complete creative freedom with your photograph. Your work will be graded on originality, creativeness, effective use of Photoshop tools and adherence to directions.

## CREATING A PAPER CURL FOR ADDED DEPTH AND IMPACT



### Step-by Step Directions

- Open a RGB image
- Using the Pen tool, draw your curl area as seen in the example above.
- Go to the Path palette and choose Save Path.
- Go to Path palette and choose Make Selection and select 0 Feather.
- Select Foreground Color Gray and Background Color White.
- Go to the Layers palette and select New Layer.
- Go to the Gradient tool in the Tool Bar.
- Drag the mouse pointer ever so slightly in the direction that the fold is going towards.

- **Repeat until gradient falls just right on your curl.**
- **Add a drop shadow by choosing Layers>Layer Styles>Drop Shadow.**
- **Go to background image and select the side opposite the curl using the pen tool.**
- **Make it a selection and press delete.**

You have complete creative freedom with your photograph. Your work will be graded on originality, creativeness, effective use of Photoshop tools and adherence to directions.

## Creating a Reflection



### Step-by Step Directions

- Open an RGB image
- Open a new document that is twice as high.
- Select the Move tool and drag your photograph to the new document placing it on the top.



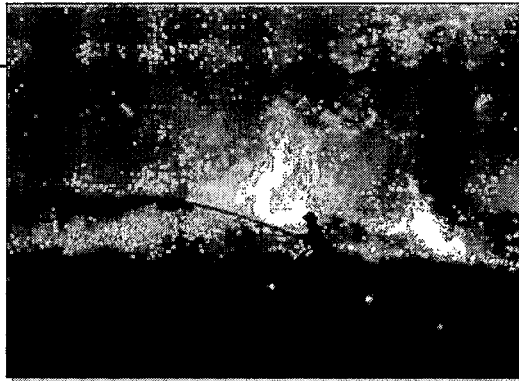
- **Click back on your original photograph and to Image>Rotate Image>Flip Vertical – your photograph is now upside down.**
- **Select the Move tool and drag your flipped image to the new document placing it on the bottom portion of the document.**
- **Align the two images so they meet perfectly.**
- **In the Layers palette select the flipped image and go to Filters>Distort>Ocean>Ripples. Select 9 for the Ripple Size and 9 for the Ripple Magnitude.**
- **Select the Elliptical Marquee tool and hold the shift key as you drag the Elliptical Marquee to make a small circle in the middle of the reflection.**
- **Feather the selection 50 pixels.**
- **Go to Filters>Distort> ZigZag filter. Under the options select Pond Ripples with an Amount of 60 and Ridges.**
- **When image is perfected, go to Layers palette and select Flatten Image.**
- **If needed, blend the area when the top and bottom image meet by using the Clone tool from the Tool Bar.**

You have complete creative freedom with your photograph. Your work will be graded on originality, creativeness, effective use of Photoshop tools and adherence to directions.

APPENDIX D  
POWERPOINT - CAREERS IN  
PHOTOGRAPHY

## PowerPoint-Careers in Photography

### Photography & Digital Imaging



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Photography offers many career opportunities with digital technology playing an important part.

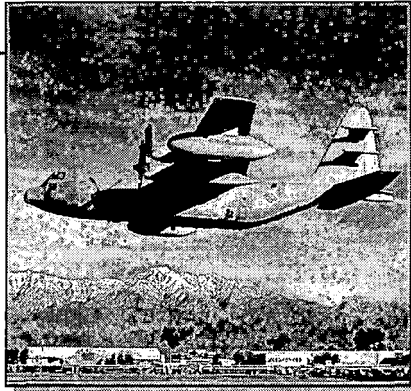
Careers in Photography/Digital Imaging

### PRODUCT PHOTOGRAPHERS



Product photography is very exacting. It takes many hours of planning and designing. In the above photograph, the photographer and his assistants are preparing a specially built kitchen set. Many photographers use digital camera backs on their 4"x5" cameras. Digital backs for large format cameras are very expensive - \$15,000 and up.

# MILITARY PHOTOGRAPHERS



©Copyright 2003 Wolin

Military photographers often produce pictures used for publicity about activities of their service. In the above photograph, an Air Force C-130 is taking-off from Ontario International Airport. Digital imaging owns much of its technology to the Department of Defense and spy satellites.

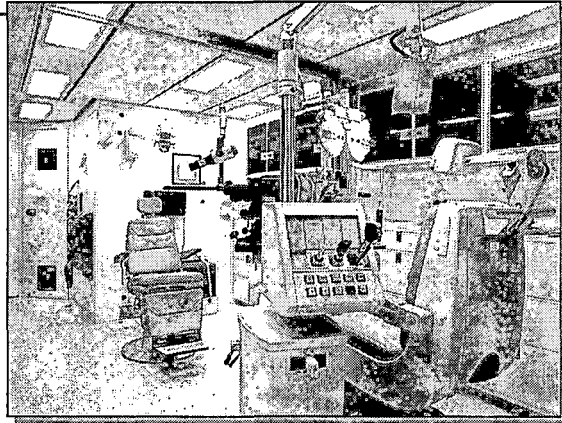
# MILITARY PHOTOGRAPHERS



©Copyright 2003 Wolin

In this photograph, a Marine, returning from "Desert Storm" is waving to the crowd who welcomed him back. This image was taken with a large telephoto lens (500mm) on a medium format camera (Pentax 6 X 7).

# ARCHITECTURAL PHOTOGRAPHERS



©Copyright 2003 Wolin

Most architectural photographs are taken on location. This kind of camera work involves taking pictures of buildings, both inside and out ( interior & exterior).

# FASHION PHOTOGRAPHERS



©Copyright 2003 Maribel Lopez

Being a successful fashion photographer can be difficult. This field attracts a lot of photographers and is highly competitive. However, if you like to work under extreme pressure and are very creative, this can be a very exciting and lucrative career.

## FASHION PHOTOGRAPHERS



©Copyright 2003 Wolin/Hoff

With the advances in digital 35mm cameras, more and more fashion photographers are starting to produce more of their photographs using this technology.

This photograph was taken on an overcast day at a beach in Southern California. A Nikon D-1X digital camera was used and the print was outputted on an Epson 1280 Ink Jet printer.

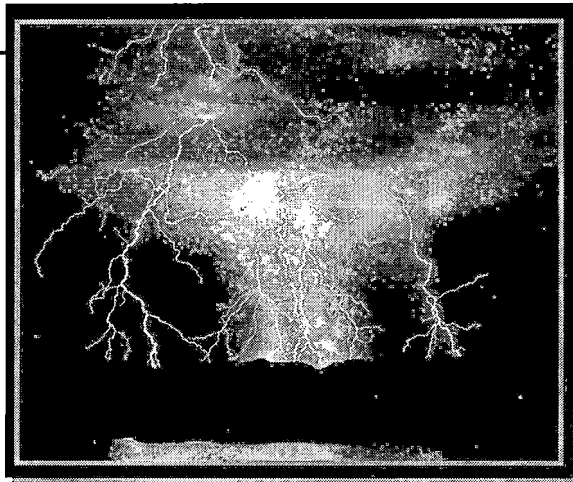
## LANDSCAPE PHOTOGRAPHERS



©Copyright 2003 Wolin

Landscape photographers travel all around the world looking for one-of-a-kind nature photographs. They often back-pack to remote areas in order to produce images that are unique. Landscape photographers often use a high end film scanner to convert their images to digital.

## LANDSCAPE PHOTOGRAPHERS



©Copyright 2003 Wolin

This photograph was taken at Lake Powell in Southern Utah. I put my camera on a tripod and left the shutter open for approximately 5 minutes.

## WEDDING PHOTOGRAPHERS



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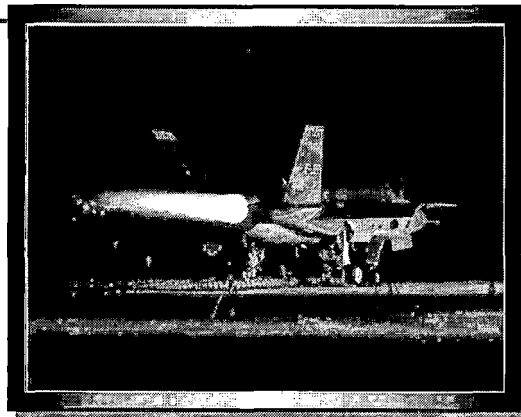
Wedding photography can be very profitable, but requires a person who works well under pressure. You are expected to produce a large volume of high quality photographs in a short period of time. Many wedding photographers have switch over to using digital cameras exclusively.

# WEDDING PHOTOGRAPHERS



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# PHOTOJOURNALIST

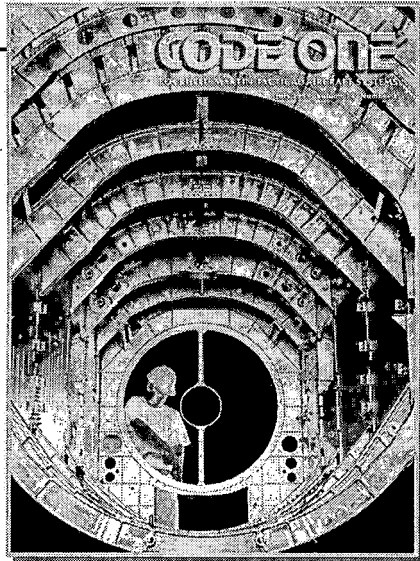


©Copyright 2003 Wolin

Almost all newspapers have staff their photographers. Large newspapers, like the Los Angeles Times, send their photographers all over the world. Being a photojournalist can be very dangerous and many have been killed or severely injured in the line of duty. A large majority of photojournalist are using digital 35mm cameras.

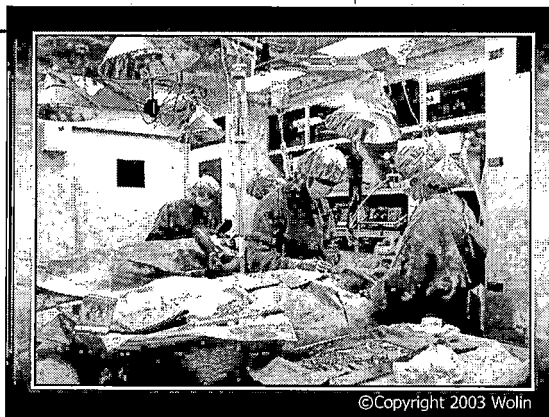


# PHOTOJOURNALIST



This photograph was taken for **CODE ONE** magazine of the Joint Strike Force Fighter (JSF). In photography, repetition of shape (the ribs) is known as "Rhythm".

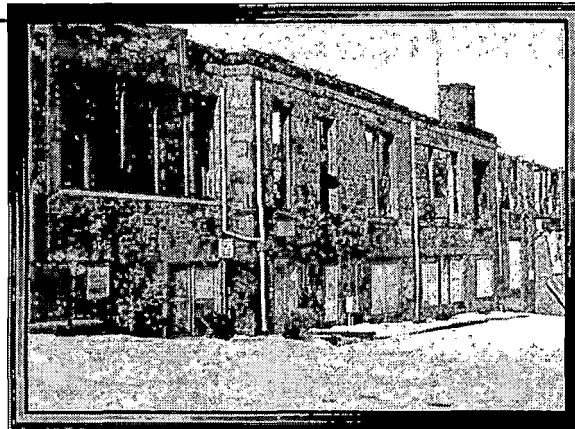
# MEDICAL PHOTOGRAPHERS



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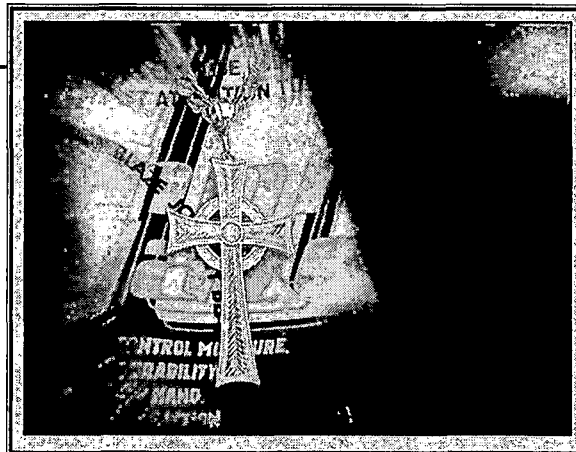
Medical photographers take photographs of diseased organs or document new surgical procedures in the operating room. Many large hospitals have their own staff photographers.

# FORENSIC PHOTOGRAHERS



Forensic or crime scene photographers take pictures used as evidence to solve crimes. In the above photograph, the fire marshal's office uses photography to help determine whether a fire resulted from arson or other causes.

## Photography & Digital Imaging



©Copyright 2003 David Irigoyen

As you can see, there are many different and exciting opportunities if you choose a career as a photographer. The list of jobs grows as new uses are found for photographs, especially in the field of digital imaging.

## Power Point-Photographic Composition

### PHOTOGRAPHIC COMPOSITION



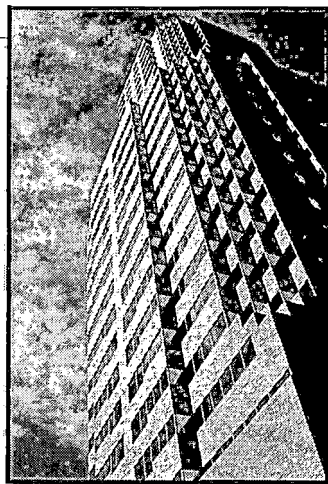
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Photographic composition is simply the pleasing selection and arrangement of subjects within the picture area.

It does not matter whether you use a digital or conventional camera, strong composition plays an important part to the success of the picture.



### Components of Composition



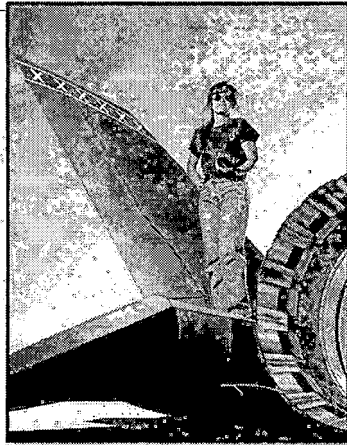
©Copyright 2003 Wolin

#### Line and Direction

Lines are one of the oldest forces in art

- Vertical lines are dominant and positive because they repeat the two vertical sides of the format.
- Horizontal lines are usually thought of as restful or passive lines.
- Diagonal Lines are dynamic and suggest movement.
- Curving lines are lines of beauty. They indicate movement and unify the straight-line elements of a composition into one rhythmic whole.

## Components of Composition



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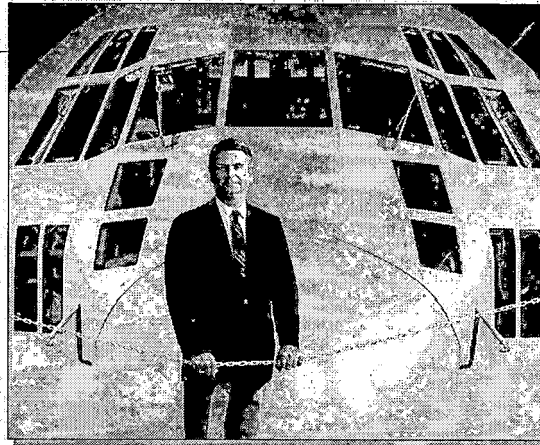
### Shape and Size

Size and shape are two of the most important elements in a photograph.

Shapes, not objects, placed in their proper size relationship within a given area, form the foundation upon which the picture is built.



## Components of Composition



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**Unity** - In order to have unity, it is necessary to have a strong dominating force. Although the background is visually powerful, there is no doubt that the man is the strong dominating force.

## Components of Composition



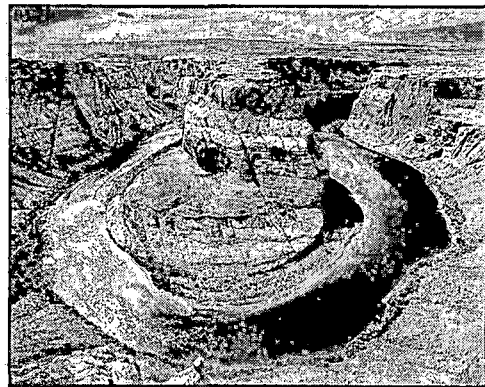
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### Gradation



Gradation is the gradual changing of one shape or tone into another, such as light into dark or small to large.

## Types of Composition



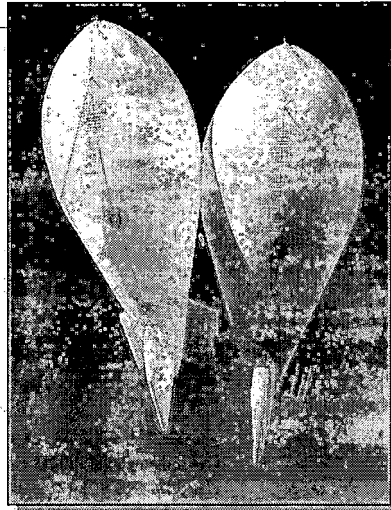
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### Circular

Something that occurs in a circular format (cups, plates, tires, etc.).

The river and the base of the plateau represent the circular shapes in this photograph.

## Types of Composition



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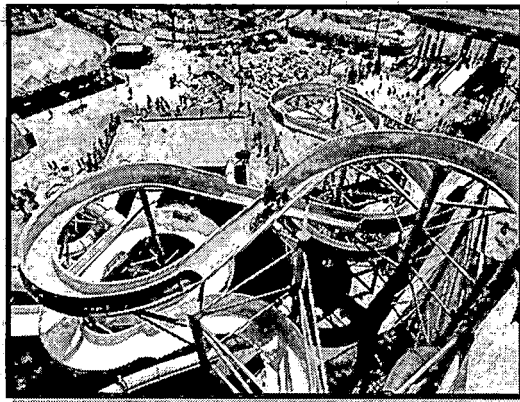
### Framing

In framing, an object or objects in the foreground, are used to "frame" an object in the background.

In this photograph, the two large balloons are used to frame the small balloon.



## Types of Composition

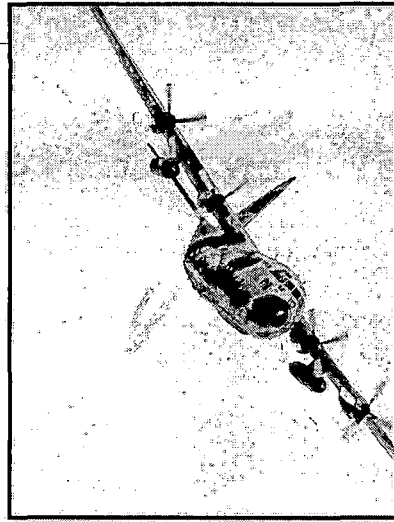


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### S-Curve -

S-shaped line or road that can occur naturally or be man-made.

## Types of Composition



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### Diagonal

An image that implies speed or motion, with action happening at an angle.



## Types of Composition



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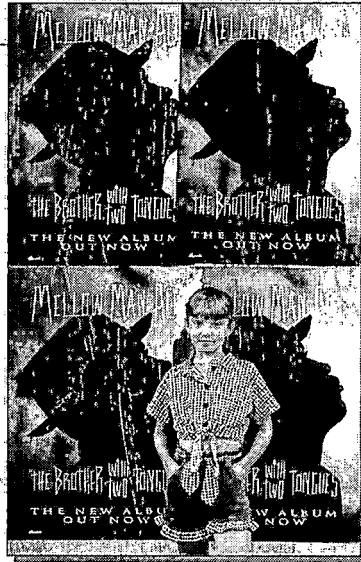
### Silhouette

A representation of an outline of something, usually filled with black, against a lighter background.





## Types of Composition



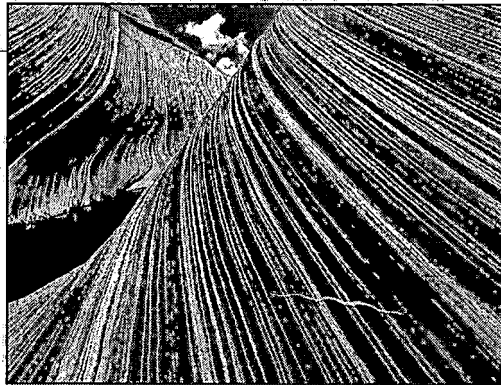
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**Rhythm** – Is the repetition of shape.

In the photograph of the little girl, the posters in the background create an interesting background and represent rhythm in the photograph.



## Types of Composition

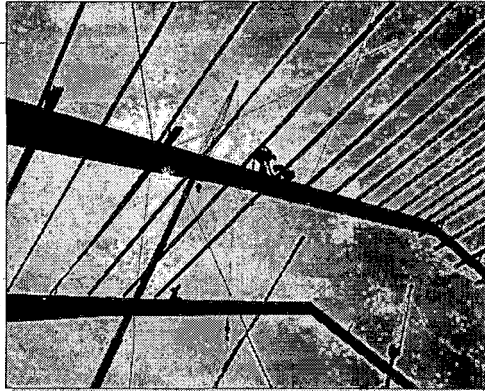


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**Leading Line** - Has a line or lines which directs the eye to the subject. The lines of the sandstone lead your eye throughout the picture.



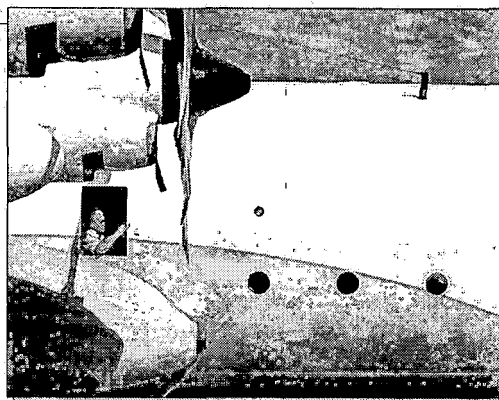
## Types of Composition



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**Intersecting Lines** - Lines that cross each other and direct the eye. There are many intersecting lines in this photograph that direct your eye.

## Types of Composition



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**Rectangle or L-Shape** - Has identifiable geometric shapes (rectangle or L) within the picture area.

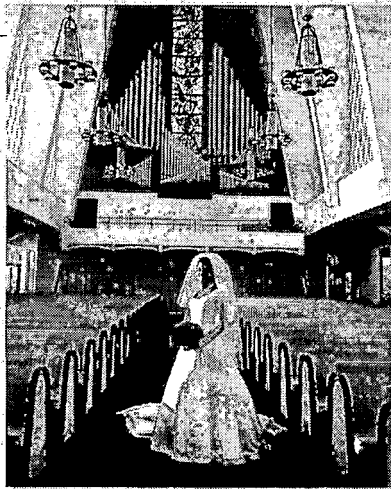
## Types of Composition



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**Rule of Thirds** - The main subject is placed on the one-third side of the photograph with the two-third side representing the negative space.

## Types of Balance



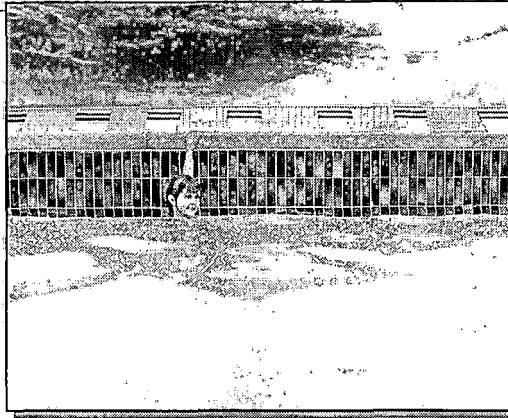
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### Formal

A formal composition is the arrangement of equal shapes placed to the right and left of the picture axis.

Forms used on the right side of the axis must be repeated on the left side and the inclusion of any distracting elements must be avoided.

## Types of Balance



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**Informal balance** is when a large visual weight of an object is counterbalanced by the small visual weight of an object.

## Depth of Field



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**Depth of field** is the amount of area in front of the subject and in back of the subject that is in acceptable sharp focus. The limited depth of field in this photograph makes the person stand out.

## Mood



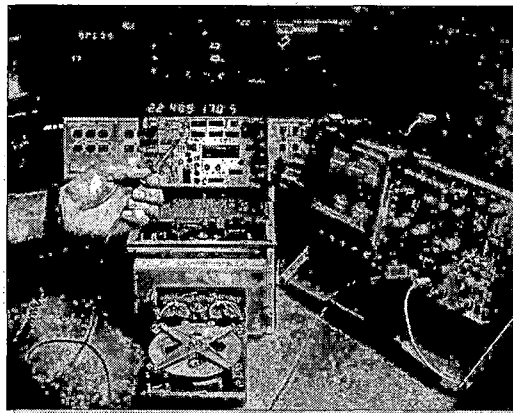
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### High Key

When the background is much lighter than the main subject (two or more times brighter), it is known as "High Key".

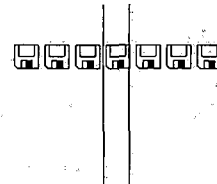


## Mood



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### Low Key



Low Key is when the tones are mostly dark and can evoke an emotional response in the viewer.

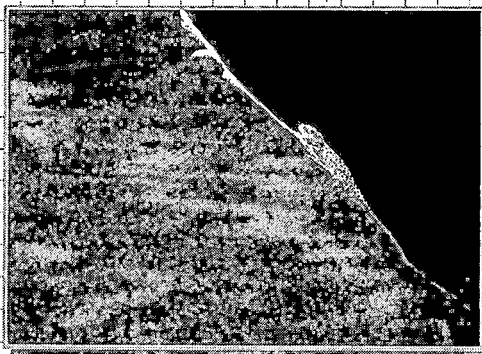
# **TECHNOLOGY CHANGES**

**CONVENTIONAL/SILVER  
HALIDE PHOTOGRAPHY  
VS.  
DIGITAL PHOTOGRAPHY**

*“The Pros and Cons”*

Is there room for both?

# **INTRODUCTION**



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**Brief History of Conventional  
and Digital Photography**

## History of Conventional Photography (Silver Halide Photography)



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- Silver Halide photography introduced in 1839
- Called Daguerreotypes -- Glass plates
- 1861 - James Maxwell invents color photography
- 1871 Dr. Richard Leach invents gelatin-bromide dry plate
- 1879 George Eastman patents a machine that coats a continuous roll of paper with emulsion

## History of Conventional Photography (Silver Halide Photography)



- 1888 - George Eastman introduces the Kodak portable box camera
- 1889 - Kodak introduces flexible celluloid film
- 1900 - Kodak introduces the Brownie Camera
- Kodak becomes a Household Name

Kodak's first marketing slogan - "You press the button,  
we do the rest."

## History of Conventional Photography Summary

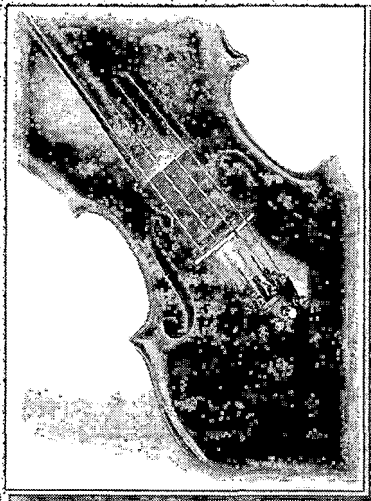
***"From its very outset, silver halide has been the material that records what is to be seen in the photograph."***

- Mike DiRienzo

***"Silver based photography continued to be the preferred technology for capturing, recording, and preserving images until the late 1990's."***

- Marty Wolin

## History of Digital Photography



- A camera was not used to take this image. A violin was placed on a flatbed scanner.

- On a flatbed scanner a moving light bar passes under an image that has been placed down on a glass plate.

- A small light-sensitive cell (the CCD) is covered with thousands of photodiodes that measure electrical activity.



# History of Digital Photography



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- 1963 - D. Gregg invents a videodisk camera - a crude forerunner to digital photography
- 1979 - Philips' and Sony's collaboration on the videodisk making digital imagery a practical reality
- 1986 - Kodak succeeds in creating a sensor that records 1.4 million picture elements, or megapixels.
- 1990 - Kodak produces the first digital camera for commercial use that is capable of recording six million picture elements.
- 2003 - Kodak announces a digital camera that is capable of recording 14 million picture elements

***"Film, so carefully crafted and refined over one hundred years, is not in imminent peril of disappearing. The writing, however, may be on the wall."*** - Will Annett/Jones Telecommunications



This photograph was taken with a Sony digital camera.

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## SILVER HALIDE PHOTOGRAPHY AND DIGITAL PHOTOGRAPHY COMPARED

	Silver Halide Photography	Digital Photography
Resolution	Depends on ISO of the film, The slower the film the higher the resolution.	Depends on the number of mega pixels and software.
Color	Depends on properties of the photographic emulsion.	Color profiles are built into the cameras firmware.
Convenience	Camera operation and convenience have been perfected over time.	Proficiency in personal computers required. Technology evolving so operability improving.
Creative possibilities	If not using own darkroom, high dependence on outside lab which limits creativity.	Infinite possibilities due to sophisticated image-editing software.
Image quality	Good image quality up to 20 times original size.	Almost unlimited enlargement possibilities with high resolution images through interpolation.
Cost	Fixed costs for cameras and other equipment relatively low. High compatibility between equipment.	Initial investment in cameras, computers, scanners, memory, and printers much higher.

## SILVER HALIDE PHOTOGRAPHY AND DIGITAL PHOTOGRAPHY COMPARED

	Silver Halide Photography	Digital Photography
Time exposures	Only limitation is reciprocity failure of the photosensitive material.	Time exposures in excess of one second are possible, but sensor element sensitivity can produce electronic noise.
Special light sources	Many restrictions apply - based on type of film used.	Electronically optimized light sensor system provide many opportunities.
Environmental condition	Limits at high and low temperatures.	Little temperature dependence, however necessary to insure stable power supply when cold.
Latitude	With most films can record up to a maximum 9 stop luminance range (with special processing).	Limit with digital cameras is 6 stops. However, technology is constantly changing.
Credibility	High credibility because film tampering easily detected.	Low credibility since no traces of tampering remain after post-exposure processing.
Durability	Deteriorate over time.	Theoretically digital data does not deteriorate.

## **DIGITAL PHOTOGRAPHY**

### **PROS**

- EVERY SINGLE SHOT CAN BE IMMEDIATELY VIEWED ON THE LCD MONITOR OF THE CAMERA
- DIGITAL CAMERAS HAVE THE ABILITY TO CHANGE THE ISO RATING FROM ONE FRAME TO THE NEXT
- CREATIVE POSSIBILITIES ARE UNLIMITED WHEN WORKING IN AN IMAGE-EDITING PROGRAM
  - THEORETICALLY, DIGITAL DATA DOES NOT DETERIORATE OVER TIME
- THE PHOTOGRAPHER HAS COMPLETE CONTROL FROM SHUTTER RELEASE TO PRINTING
- DIGITAL IMAGES HAVE LESS GRAIN/NOISE THAN SILVER HALIDE FILM

## **SILVER HALIDE PHOTOGRAPHY**

### **PROS**

- CAMERA EQUIPMENT RELATIVELY INEXPENSIVE
- IMAGE QUALITY DIFFERENCE BETWEEN LESS EXPENSIVE EQUIPMENT VERY LITTLE, IF ANY
- PHOTOGRAPHIC FILM & PAPER HAVE BEEN PERFECTED
  - HIGH CREDIBILITY WHEN USED IN ADVERTISING, JOURNALISM, AND FORENSICS
  - CURRENTLY RESOLUTION OF FILM IS HIGHER THAN DIGITAL
- CURRENTLY EXPOSURE LATITUDE OF FILM IS GREATER THAN DIGITAL

## **SILVER HALIDE PHOTOGRAPHY**

### **CONS**

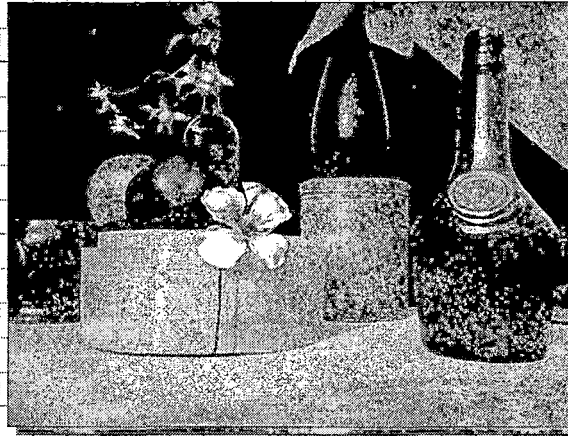
- CHEMICALS USED IN PROCESSING AND PRINTING HARMFUL TO THE ENVIRONMENT
- DIFFICULT TO MANIPULATE IMAGES AND CERTAIN SPECIAL EFFECTS IMPOSSIBLE
- PHOTOGRAPHIC FILM, PAPER, AND PROCESSING ARE EXPENSIVE
- SILVER HALIDE FILMS DETERIORATE OVER TIME
- PERFECTING THE CRAFT OF B&W AND COLOR PRINTING TAKES MANY YEARS
- FILM IS VERY SENSITIVE TO SCRATCHES AND DUST

## **DIGITAL PHOTOGRAPHY**

### **CONS**

- HIGH INITIAL COST - EQUIPMENT AND SOFTWARE NEED TO BE UPGRADED DUE TO ADVANCES
- THE CAMERA YOU PAID \$5000 FOR LAST YEAR IS OUTDATED AND LOST HALF ITS VALUE
- IMAGES CAN ACCIDENTALLY BE ERASED
- STORAGE MEDIA MAY NOT BE READABLE IN THE FUTURE AS FORMATS AND DEVICES CHANGE
- LOW CREDIBILITY SINCE IMAGES CAN BE TAMPERED WITH, LEAVING NO TRACE
- CALIBRATING YOUR MONITOR SO IT MATCHES YOUR OUTPUT CAN BE DIFFICULT

## TECHNOLOGY CHANGES



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Is the future of photography digital?

Is there room for both conventional and digital  
photography?

## TECHNOLOGY CHANGES

The best of both worlds...

By scanning film, which has a better resolution than current digital cameras, one can combine the best of both technologies. Scanned images can then be enhanced and manipulated using image-editing software and outputted producing the best possible quality.

The tonal range possible by incorporating both technologies is far greater than each by itself.



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